

# **Workshops on Improved Planning and Shop Loading in Shipyard Production Shops**

U. S. DEPARTMENT OF THE NAVY  
CARDEROCK DIVISION, NAVAL SURFACE  
WARFARE CENTER

in cooperation with

**Newport News Shipbuilding**

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• Overall Quality of Report

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• Useful to You/Your Organization

☐ Very Useful ☐ Moderately Useful ☐ N/A

• Did/will your organization implement the results of this project? ☐ Yes ☐ No

If not, why? \_\_\_\_\_

• How Did You Receive Report?

☐ Mailed directly to you

☐ Referred to you by someone else

• Did/Will You Pass Report On To

Someone Else? ☐ Yes ☐ No

• In Your Opinion, Is Anything Missing That Would Make This Report Better?

☐ Yes \_\_\_\_\_

• General Comments

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# **FINAL REPORT**

## **WORKSHOPS ON IMPROVED PLANNING AND SHOP LOADING IN SHIPYARD PRODUCTION SHOPS**

+ + +

**Prepared by  
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**For  
NEWPORT NEWS SHIPBUILDING AND DRY DOCK COMPANY  
4101 Washington Avenue  
Newport News, Virginia 23607**

**In Behalf of  
SNAME Ship Production Committee Panel SP-8  
on  
Industrial Engineering**

**Under the  
NATIONAL SHIPBUILDING RESEARCH PROGRAM**

+ + + + + + +

**March 1993**

**Task 8-90-4**

## PREFACE

The National Shipbuilding Research Program is sponsored by the Maritime Administration United States Department of Transportation and by the United States Navy toward improving productivity in shipbuilding. An important part of this Program is carried out by SNAME Ship Production Committee Panel SP-8 on Industrial Engineering. The Workshops described herein were sponsored by Panel SP-8 as a means of communicating information to the members of the shipyard community on a technique for Improved Planning and Shop Loading in Shipyard Production Shops. The technique was initially developed at Peterson Builders, Inc., Sturgeon Bay, WI as NSRP Task EC-12 entitled *Scheduling Standards Pilot Project* (see NSRP Publication #0157 of Sept 1981). The technique has been used in the Pipe Fabrication Shop at PBI since that time, where it has been improved, expanded, and is now computer-supported.

This Task identified as NSRP Project 8-90-4, was conducted by Robinson-Page-McDonough and Associates, Inc. (R-P-M) under Newport News Shipbuilding and Dry Dock Company Purchase Order No. P2283T-0-N10. Workshop Director was Rodney A. Robinson Vice President of R-P-M. Performance of the Task began in December, 1991 and was completed in March 1993.

Appreciation is expressed to Daniel D. Kressig and to Dale D. Neinas, both of Peterson Builders, Inc., for their assistance in providing information needed for the Workshop presentations.

## EXECUTIVE SUMMARY

This Project developed and delivered a series of nine Workshops on *Improved Planning and Shop Loading in Shipyard Production Shops*. 159 shipyard people from all areas of the Country were in attendance. Each Workshop was conducted during the morning and afternoon of one day, at *no cost* to the attendees. The specific locations where the Workshops were held are listed on page 6 of the Final Report. The actual attendees, their shipyard affiliation and their functional position in that shipyard, are listed in Appendix D.

The material presented at the Workshops was developed during several projects under the National Shipbuilding Research Program. Peterson Builders, Inc. of Sturgeon Bay, WI is the location where the initial research was carried out. In particular, the pipe fabrication shop at PBI was the first shipyard activity to develop and apply scheduling standards in real time for planning and shop loading of work orders. The initial application took place in 1981. Since that time, other follow-on projects have identified alternate techniques for developing scheduling standards, greatly reducing the time and effort needed to create these “tools”. PBI has continued to use scheduling standards in their pipe fabrication shop ever since the initial trial, and has improved and expanded their development and application with impressive results. The history of this technique, the alternate methods for creating scheduling standards, and the practices currently being applied at PBI were covered in detail during each Workshop. Each attendee also received a Handout (described on pages 2 through 4 of the Report) which will provide reference information for those wishing to try this technique in their own shipyard.

Each Workshop also offered a segment on the general organization and operating procedures of the NSRP, along with the SNAME Ship Production Committee, its Panel structure and participants. The project reports and research material available from the NSRP library were also discussed. It was quite revealing to hear comments from several attendees that this was the first information that they had ever received about the NSRP. This situation underscores the two conclusions and recommendations that appear on page 21 of the Report. Take another minute or two and read them. They reflect something that we CAN do to improve our shipyard community and the people in it.

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**FINAL REPORT**  
**on**  
**NSRP PROJECT 8-90-4**

**WORKSHOPS ON IMPROVED PLANNING AND SHOP LOADING  
IN SHIPYARD PRODUCTION SHOPS**

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**BACKGROUND**

The process of planning and scheduling work in a shipyard production shop requires a prediction of how much real time will be consumed by a worker (or by a group of workers) in accomplishing an individual work package. On the surface this sounds fairly simple, and yet the process constitutes one of the more difficult tasks in managing and controlling shipyard work. This is because the prediction element has been so uncertain in actual practice.

Several NSRP projects have studied this problem area over the past 10 years. The growing body of knowledge has shown promise of being able to resolve the prediction dilemma once and for all. Techniques for the generation and application of real time scheduling standards (a particular type of labor standards) have been developed and are being implemented in at least one shipyard with impressive results.

This NSRP Project, identified as 8-90-4, was sponsored in 1991 by SNAME Ship Production Committee (SPC) Panel SP-8 on Industrial Engineering. The Project would consist of a series of eight to ten one-day Workshops conducted at several locations throughout the Country to discuss the NSRP projects that have been carried out in the area of improved planning and shop loading in shipyard production shops. The intended audience would be shipyard managers, industrial engineers, planners, estimators, schedulers, and others involved in work planning and shop loading operations. The general desire was to arrange the Workshops for easy no-cost access by shipyard personnel in each area.

Competitive proposals were requested for performance of this Project. Following review of the submissions, Robinson-Page-McDonough and Associates, Inc. (R-P-M) was selected to conduct the Workshops. Newport News Shipbuilding and Dry Dock Company (NNEWS) Purchase Order No. P2283T-0-N10 was awarded to R-P-M on 04 December 1991.

## **TECHNICAL APPROACH**

Workshops would be reconducted at several locations throughout the Country to enable interested shipyard personnel in each locality to attend without excessive travel expense and time away from their jobs. There would be no fee for attendance at the Workshops. Each Workshop would present background information from the NSRP Projects conducted in 1982/83 that initiated the technique for improved planning and shop loading, along with a comprehensive treatment of the materials developed more recently. Included would be an explanation of the labor standards hierarchy, the development of classification-level labor standard data the development of non-process factors for production work areas, the development of statistically-based formulae from in-house performance data for use in predicting production performance, and the application of these items for planning and scheduling production work at the work package level. The Workshops would be structured but informal, with adequate opportunity for the attendees to ask questions and explore the several points being presented. A comprehensive set of Workshop materials would be left with each attendee.

In addition each Workshop would offer a separate presentation on the NSRP, its structure, panels, functions, projects and participants. Surveys have shown that a broad segment of personnel in the shipyard community are unaware of the NSRP and all that it has to offer. This presentation would be designed to provide the attendees with a better understanding of this important research effort. It would be offered at the end of the other Workshop material, so that those who already know about the NSRP and wish to leave early might do so.

## **DETAIL DESCRIPTION**

### **(1) PREPARATIONS**

Preparations for the Workshops included the assembly of a suitable Handout for the attendees, preparation of a series of Viewgraphs for use during the Workshops, design and distribution of a Brochure to advertise the Workshops, development of an Evaluation Sheet to gather the opinions of the attendees on certain points of interest, plus the detailed logistical and administrative Arrangements associated with the execution of each Workshop. These are discussed separately below.

#### **(A) Handout**

The following NSRP documents were assembled to form the Handout for the Workshops. They were reproduced by copy machine, and were presented in three-ring binders with a suitable cover page and index. (536 p.)

**(1) NSRP 0335 Aug 1991- The National Shipbuilding Research Program (NSRP) Information Booklet and Guide**

**Abstract:** This document describes the background and history of the NSRP, and explains the multi-disciplined cooperative nature of this research program. It discusses the NSRP desire for applied research implementation. It includes a policy statement about the projects submitted for funding. The objectives of the NSRP are identified, and the organizational components are explained. Details about project submission are included, along with a sample project abstract. Charts are utilized to display the organizational aspects of the NSRP. (28 p.)

**(2) NSRP 0199 Dec 1983 - A Primer on an Approach to Planning and Production Control for the Smaller Shipyard**

**Abstract:** The information presented here suggests that standards, particularly scheduling standards, can offer major advantages to the smaller shipyard striving to improve production performance, with only a modest investment in time and money. A 6-month pilot program conducted at one smaller shipyard provoked a throughput increase of 50 percent in a pipe fabrication shop. This throughput increase grew to 500 percent in the 18 months following the pilot program with the same number of production workers in the shop. The success achieved during and after this pilot program along with several appeals from the smaller shipyard community, prompted the development of this primer. (150 p.)

**(3) NSRP 0157 Sep 1981- Scheduling Standards Pilot Project Summary Report**

**Abstract:** This seven-month project tested the application of scheduling standards in a shipyard pipe fabrication shop. Actual hands-on data was accrued, analyzed, and applied during three separate testing periods. Results show that fabrication man-hours were reduced by about one-third, permitting the fabrication of about 50 percent more pipe with the same number of fabricators. The key to success is the scheduling standard, developed from engineered labor standard data plus a factor to accommodate non-process considerations. The scheduling standard accurately predicts real work content, allowing for major improvements in work loading, planning, and scheduling from which the savings result. (95 p.)

**(4) NSRP 0277 Sep 1987 - Improved Planning and Shop Loading in Shipyard Production Shops**

**Abstract:** This report discusses two ways to improve the quality of the prediction commonly used during planning and scheduling operations, of how much real time will be consumed by a worker (or workers) in accomplishing a work package. The two ways are: use of scheduling standard data coupled with a current non-process factor unique to that shipyard work area; and use of a statistically-based prediction formula

developed from current performance data measured in that shipyard. Improving the quality of the prediction will in turn improve the useability of the planning and scheduling determinations associated with performance of a work package. (61 p.)

**(5) NSRP 0325 Jun 1982- Scheduling Standard Pilot Project Companion Activity Final Report**

**Abstract:** This pilot project has investigated the use of engineered labor standards, specifically the MOST system to establish standards useful for shop loading and scheduling. The key element in the investigation is the development of the non-process factors. The present report describes the data procedures, and results of this companion activity, which seeks to find a statistical basis for predicting the real time needed to accomplish a work package. (38 p.)

**(6) NSRP 0278 Jun 1987 - Developing Scheduling Standards using Regression Analysis: An Application Guide**

**Abstract:** This application guide presents a step-by-step introduction to the development of scheduling standards using regression analysis. The presentation employs an example taken from a shipyard sheet metal shop and discusses the issues and procedures in constructing scheduling standards from work-order-level data on actual fabrication times. The methods described have been applied in three different shipyard shops, and in each case have produced scheduling standards with a prediction accuracy of at least 10 percent when applied to a set of work orders representing roughly a manweek of work. The cost to establish scheduling standards using these methods compares very favorably to the cost for other techniques, especially if engineered labor standards or measured labor standards must be available for those other methods. (48 p.)

**(7) National Shipbuilding Research Program - Bibliography of Publications and Microfiche Index 1973-1991 (Partial)**

**Abstract:** This bibliography contains information on all reports produced under the auspices of the NSRP from 1973 through 1991. New reports are added each year. AU material is arranged by NSRP Ship Production Committee Panel Number. Within each Panel the material is in chronological order. Each entry lists the NSRP number, title, author, date, and keywords assigned to that publication, along with an abstract of the report contents. The number of pages in each report is given at the end of the abstract. There is an index for NSRP number, report title, author, and keywords. (Note: Only the portion covering NSRP reports was included in the Handout for the Workshop attendees. 116 p.)

## **(B) Viewgraphs**

A large number of viewgraphs were prepared for use during the Workshops, so that the attendees would have something to look at as the various points of information were being made. **Appendix A** contains copies of most of the viewgraphs prepared for the Workshops. In addition to this material, some hard-copy 'props' were utilized to illustrate certain points.

## **(C) Brochure**

A brochure was developed to publicize the Workshops. It provided information on the general nature of the Workshops, and contained sections on Background, Objective, Workshop Segments, Administrative Details, Dates and Places, How to Register, and the Workshop Leader. The brochure was printed in two colors on bright yellow card stock, and when folded was pocket sized, measuring 3-1/2" by 8-1/2". A tear-off and mail-in registration sheet was included in the brochure. Registrations were desired so that room size and quantity of Workshop materials could be properly planned in advance. **Appendix B** is a copy of the information contained in the brochure.

About 1500 copies of the brochure were distributed throughout the shipyard community. A supply of brochures was mailed to 89 specifically selected individuals in 81 shipyards, companies, and universities. In addition, several dozen brochures were distributed at SPC Panel SP-1, SP-3, SP- 5, SP-8, and SP-9 meetings during the summer and fall of 1992.

## **(D) Evaluation Sheet**

A brief one-page Evaluation Sheet was designed to capture attendee opinions about several points of the Workshops. The Evaluation Sheet was distributed to the attendees after each Workshop was concluded, with the request that they fill it out. Included was a space for adding their suggestions and recommendations for future projects that they feel might help to improve the shipbuilding industry. A copy of the Evaluation Sheet is contained in **Appendix C**.

## **(E) Arrangements**

A schedule of Workshops and their locations was developed in full consideration of the shipyard personnel in each area of the Country. Generally, each Workshop was conducted in a motel/hotel near a group of shipyards, so that attendees were away from their usual places of business, thereby avoiding the interruptions and the access problems that might accompany a Workshop within a particular shipyard. Each Workshop was conducted during the morning and early afternoon of one day. The availability of no-host luncheon facilities was assured at each location. Coffee was provided in the morning, and cold soda/juices in the afternoon. Each Workshop was scheduled to begin at 8:30 AM.

There was no registration fee. A Handout was distributed to each attendee for use during the Workshop, and as reference material for later study.

The specific location of each Workshop was as follows. (Note: In response to the large number of registrations received from Bath Iron Works personnel to attend the Workshop in Portsmouth a separate Workshop at Bath, ME was added to those initially planned, so that the travel by BIW personnel could be avoided.)

**08 Oct 1992- Sturgeon Bay, WI**

Cornerstone Conference Center, 222 N. 3rd Avenue

**13 Oct 1992- Baltimore, MD**

Ramada Inn Towson - North Loch Raven Exit 29 off I-695 (Fantail Room)

**02 Nov 1992 - Norfolk, VA**

Holiday Inn - Portsmouth - Waterfront, 8 Crawford Avenue (Portside B)

**04 Nov 1992- Bath, ME**

Bath Iron Works, Shipyard Conference Room

**05 Nov 1992- Portsmouth, NH**

Sise Inn 40 Court Street (Sise Room)

**12 Nov 1992- Bremerton, WA**

Puget Sound Naval Shipyard Officer's Club (Fleet Room)

**17 Nov 1992- Vallejo, CA**

Holiday Inn Marine World Africa USA, 1000 Fairgrounds, I-80 Exit 37

**02 Dec 1992- San Diego, CA**

Radisson Hotel - Harbor View, 1646 Front Street

**08 Dec 1992- Pascagoula, MS**

La Font Inn Highway 90 East

**10 Dec 1992- Houston, TX**

Holiday Inn Channelview - East Belt, 15157I-10 East Channelview

NOTE: This Workshop was later canceled due to insufficient registrations.

**06 Jan 1993- Honolulu, HI**

Best Western The Plaza Hotel International Airport, 3253 N. Nimitz Highway

NOTE: This Workshop was later canceled due to insufficient registrations.

## **(2) PRESENTATION OF WORKSHOPS**

Nine Workshops were conducted, with a total of 159 actual attendees. Each Workshop is discussed separately below, with details about the number of registrations, the number of actual attendees, and specific comments on each Workshop. A complete listing of registrants and attendees, along with their shipyard associations and positions, is contained in **Appendix D**.

### **Sturgeon Bay, WI- 08 Oct 1992: 29 registered; 22 actual attendees**

- 17- Peterson Builders, Inc., Sturgeon Bay, WI
- 2- Palmer Johnson Sturgeon Bay, WI
- 2- Bay Shipbuilding Corporation Sturgeon Bay, WI
- 1- Marinette Marine Corporation Marinette, WI

This initial Workshop was deliberately planned for Sturgeon Bay so that the personnel from Peterson Builders, Inc., who were (and are) involved in the activities on which this series of Workshops is based, might attend and lend their comments toward improving the follow-on Workshops. This initial Workshop clearly was not as smooth and orderly as desired, with some of the material being presented in a disjointed and confusing fashion. The comments received from the attendees were most helpful in improving the remaining Workshops. After this first Workshop was concluded, all of the Workshop material was completely rearranged and several viewgraphs were added for clarification. The conference room arrangement and the amenities at this location were superior and totally satisfactory.

### **Baltimore, MD -13 Oct 1992: 7 registered; 8 actual attendees**

- 5 -U. S. Coast Guard Yard, Curtis Bay, MD
- 2- Bethlehem Steel Corporation Sparrows Point Shipyard, MD
- 1- Naval Sea Systems Command (Sea 0724), Washington DC

Although this group was small in numbers, the attendees were quite interested in the material being presented, and were intense in their reception of the various points being offered. One of the attendees had been involved with this technique several years ago, but noted that his shipyard had decided not to attempt the application of it (much to his personal distress). The only problem at this Workshop was that the overhead projector was not set up on time as ordered, which caused some difficulty with presentation of the early material. The projector arrived after the first hour had been completed, and worked satisfactorily thereafter. The room was immediately adjacent to the dining area but there was no interference or detracting of importance.

**Norfolk VA -02 Nov 1992: 17 registered; 12 actual attendees**

8- Newport News Shipbuilding, Newport News, VA

3- Norfolk Shipbuilding Company, Norfolk VA

1- Charleston Naval Shipyard, Charleston, SC

This Workshop was straightforward. The attendees expressed considerable interest in the material being presented, especially the NSRP material covered during the last segment. The room was comfortable, and the amenities were acceptable but not opulent.

**Bath, ME -04 Nov 1992: 26 registered; 18 actual attendees**

18- Bath Iron Works Corporation Bath ME

This Workshop was added to the schedule in order to accommodate the large number of BIW personnel who had registered to attend the Workshop at Portsmouth NH, and thereby avoid a considerable amount of travel time and expense on the part of the BIW personnel wanting to attend a Workshop. Arrangements were made to hold this Workshop in a conference room within the BIW shipyard complex at Bath ME. The room was austere, but the enthusiasm of the attendees was most gratifying. The Workshop proceeded without difficulty, even though the hastily-prepared coffee was downright chewable.

**Portsmouth, NH -05 Nov 1992: 23 registered; 21 actual attendees**

19- Portsmouth Naval Shipyard, Portsmouth NH

2- Bath Iron Works, Bath, ME

This Workshop proceeded without difficulty. The room was crowded, but not uncomfortably so. The amenities were excellent and plentiful. This location is a popular Inn with all the charm and comfort that is associated with a restored Victorian mansion. Despite the pleasant surroundings, those present were attentive and interested in the material being presented, especially the NSRP material offered during the last segment.

**Bremerton, WA -12 Nov 1992: 28+ registered; 27 actual attendees**

25- Puget Sound Naval Shipyard, Bremerton WA

1- Todd Pacific Shipyards Corporation Seattle, WA

1- American Management Systems, Bremerton WA

This Workshop was held in the Officer's Club at the Puget Sound Naval Shipyard. Access was not a problem however, because this area is outside of the Controlled Industrial Area of the shipyard. Arrangements were quite satisfactory. The attendees were interested in the material, but several felt that they would really not be in a position to utilize the techniques.

**Vallejo, CA -17 Nov 1992: 31+2? registered; 15 actual attendees**

- 14- Mare Island Naval Shipyard, Vallejo, CA
- 1- Charleston Naval Shipyard, Charleston SC

The timing of this Workshop was arranged to immediately precede the meeting of SNAME SPC Panel SP-8 on Industrial Engineering which was held at the same location. This arrangement would enable those planning to attend the SP-8 meeting to consider arriving a day early to attend the Workshop. Although only one person did so, the opportunity was there for all. The Workshop proceeded without difficulty. The conference room was comfortable, and the amenities were satisfactory.

**San Diego, CA -02 Dec 1992: 25 registered; 20 actual attendees**

- 15- National Steel and Shipbuilding Co., San Diego, CA
- 2- General Dynamics/Electric Boat Div., Groton CT
- 1- General Dynamics/Quonset Point, RI
- 1- Bethlehem Steel/ Sparrows Point Shipyard, MD
- 1- Maritime Administration 700 Washington DC

This Workshop was arranged to immediately precede the meeting of SNAME SPC Panel SP-5 on Human Resources Innovation which was held at the same location. Several attendees took advantage of the timing arriving a day early and attending both meetings. The Workshop was straightforward and proceeded without difficulty. The conference room was spacious, quiet and well appointed. The amenities were quite satisfactory.

**Pascagoula, MS -08 Dec 1992: 22 registered; 16 actual attendees**

- 10- Avondale Industries, Inc., New Orleans, LA
- 6- Ingalls Shipbuilding Division, Pascagoula, MS

This Workshop proceeded without difficulty. The conference room was large and quiet. The amenities were plentiful and satisfactory. There were adequate opportunities for comments and discussions, with the attendees freely expressing their concerns.

**Houston, TX- 10 Dec 1992: 2 registered; Workshop CANCELED**

This Workshop was planned to accommodate the shipyards and marine personnel in the greater Houston area. Due to the small number of registrants, the Workshop was canceled on 23 Nov 1992. Handouts were mailed to each of the two registrants.

**Honolulu, HI- 06 Jan 1993: 5 + 20? registered; Workshop CANCELED**

This Workshop was planned to accommodate the personnel at Pearl Harbor Naval Shipyard, along with those at Honolulu Shipyard, Inc. Due to unexpected financial restrictions abruptly imposed on the Pearl Harbor Naval Shipyard, no personnel from that location would be able to attend the Workshop. Due to the small number of prospective attendees remaining, the Workshop was canceled on 21 Dec 1992. Handouts were mailed to the registrants from Honolulu Shipyard, and several Handouts were mailed to the contact at Pearl Harbor Naval Shipyard for distribution as appropriate.

## **RESULTS AND CONCLUSIONS**

### **(1) EVALUATION SHEET ENTRIES**

#### **(A) General Evaluation**

The following comments were obtained from review of the Evaluation Sheet entries made by the attendees:

89% (of 139 entries) thought that the SPEED was "about right".

8% thought that the speed was "too slow".

3% thought that the speed was "too fast".

88% (of 138 entries) thought that the VISUAL AIDS were "clear".

6% thought that the visual aids were "confusing".

6% thought that "more" visual aids were needed.

86% (of 139 entries) thought that CLASS TIME was "about right".

10% thought that class time was "too short".

4% thought that class time was "too long".

79% (of 140 entries) thought that the ORGANIZATION was "clear".

19% thought that the organization was "mixed".

2 % thought that the organization was "confusing".

53% (of 75 entries) thought that the CONTENT was "too general".

36% thought that "more" content was needed.

11% thought that the content was "too specific".

80% (of 145 entries) thought that the material was USEFUL to them.

11% thought that the material would be "useful to others".

9% thought that the material was "not useful" to them.

## **(B) Specific Comments on Workshop**

Several attendees offered comments on their overall impression of the Workshop. A sampling of these verbatim comments is as follows:

+ Good for content of how non-productive time is a major issue, along with the impact of detail design - that is, number of joints, fixtures, etc. (Director of Engineering)

+ Very good. Gave me ideas to think about. (production Manager)

+ Very useful in providing an industry-related perspective. I appreciate the Instructor's perspective, and no-nonsense approach. (Design Coordinator)

- Next Workshops will be interesting, as not so friendly a camp (as at PBI). (Production Manager)

- Descriptions of NSRP was too lengthy and emphasized politics / conflicts too much if the true purpose is to sell program. Over simplified subject to a great extent. Emphasis on identifying non-process time. (Industrial Engineering Manager)

+ Helpful in answering questions that are important. Many questions still need to be asked, i.e., piping installation area. (Industrial Engineer)

- Needs more preparation to provide a clear information flow. Overheads did not seem timely to support discussion. Manual poorly organized - hard to follow and/or find place. (Planner)

+ Provided good information for future use in shop work practices and processes. (General Supervisor)

- Could have some break-out sessions to work on some brainstorm ideas on how/where else to apply. (Manager)

+ Very good and informative. I would like to get involved. (Senior Planner)

+ Obviously would be very useful /profitable in the longer term but seriously doubt management investment in formulation of standards, etc. (planner)

+ Good introduction to "real time" standards. The level of instruction was aimed more at non-industrial engineers. It was very informative to learn about the private, manufacturing side of the business. (Senior Industrial Engineer)

+ Outstanding. Excellent. (Production Superintendent)

+ Good to learn Industry is working toward unitizing. Informative. (Chief Engineering Division)

+ Good subject to listen to. (General Foreman)

- The speed was about right, but the treatment was too brief and cursory. Would have preferred a more detailed explanation of the development of the process. (Production Resources Manager)

Handout was valuable, particularly the bibliography of NSRP paper. (Production Resources Manager)

+ Fair. Good presentation on the NSRP and the standards topic was appropriate. Just a bit more brief and lacking in specifics than I would have preferred. (Production Resources Manager)

Would like to see more information on implementation procedures included in the discussion. (plant Manager, Production)

+ Informative, well presented, enjoyable. (Plant Manager, Production)

+ Good. Touched upon areas that are necessary to focus on in competitive times. Opened an area that I did not know existed. (Supervisor of Planning)

Need more examples of case studies to improve potential for further implementation. (Supervisory Manufacturing Engineer)

+ Good overview of NSRP and its affiliation with SNAME and SPC'S. (Section Manager, Production Planning and Control)

- What are foreign yards doing? (Industrial Engineer)

+ Fine Workshop. Excellent. (Manager Manufacturing Engineering)

+ Wish others at the shipyard would know about this material. Very informative. (Production Controller Supervisor)

Some transparencies could have been better. Need more specific project type material. (Nuclear Director)

+ Excellent information provided. You need more promotion of what NSRP is doing. (Nuclear Director)

+ (There is) not enough shipyard knowledge of SP panels. This was a worthwhile method to get information out. (Industrial Engineer)

Excellent presentation. The material was very relevant to the problem of estimates vs. actual cost. (It) provided information on where to get NSRP material. Many of the topics look very useful. (General Foreman Elec/Elex)

- More examples of the non-process values which can be and were eliminated at Peterson - (would) help to drive home the payback of refining the process over time. (Industrial Engineer)

+ Very informative both in the primary emphasis on planning and shop loading, as well as the overview of the NSRP. (Industrial Engineer)

- Content was good but does not relate or demonstrate benefits to the large organizations in terms of results. (Supervisor Production Shop Planner)

+ Presenter kept topic alive and interesting. Management needs to understand the value of industrial engineering through improved planning, together with the planners. Very interesting. I wish more people attended. (Industrial Engineer)

- Not much on either mechanical or electrical/electronic areas. (Elec/Mech Group Superintendent)

+ Should be given at (our shipyard) to as many people as you can. Very good. (Supervisory Scheduler)

+ A good overview of what is happening. Enlightening. I didn't know that the NSRP existed. (Planning Supervisor-Production Shops)

+ Very interesting - I had no idea about NSRP. Worthwhile. (Superintendent)

+ The seminar was well focused on the history of NSRP and its capabilities today. The material serves no direct day-to-day work unless certain publications are purchased. The specific publications will help. (Scheduling Supervisor)

+ An "eye-opener". (Industrial Engineer)

+ Good subject. More specifics would be interesting. Enjoyed the Workshop and its content. Know now that NSRP is a very good data bank to be tapped. Very good. (Industrial Engineer)

+ Very good presentation. I enjoyed it, and was made aware of the NSRP for the first time. (Nuclear Director)

+ Planners should definitely attend. Informative as to available resources and reference material. (Production Engineer)

+ The material was sufficient to meet my level of need. Quite informative. I now have a much better appreciation for NSRP and its purpose. (Production Engineer)

+ Valuable to generating additional thoughts on process improvement. Got a mixed group of people in one room so a broad range of questions/issues surfaced. (Principal Planner)

- Details of specific scheduling areas would be of help. (Technical Planner)

- The visual aids did not always relate to the talk at the time which made them slightly confusing. The aids could have related more closely to the notebook. The organization of the material was slightly confusing because it seemed to jump around. (Management Development Intern)

+ The Workshop was very applicable to (our shipyard) The material and problems presented related closely to some company issues making it relevant to the company as a whole. (Management Development Intern)

+ Interesting presentation of material. Good understanding of background of this pilot was very good and useful. A lot of information provided for future reading, etc. Going through the material at a high level was helpful, compared to covering all of the detailed information in the handout. (Manager, Estimating)

- Perhaps less time spent on past history and more time spent on how to set up such a process, pitfalls, items to consider. No need to go into as much detail on NSRP as was done. (Assistant Foreman)

+ Good presentation. I would like to get more involved with ideas or approaches to planning and scheduling. (Supervisor Shop Floor Control)

+ Information was factual and interesting. Subjects changed often enough to keep my interest throughout the presentation. (Planner)

- You might hand out an example and just walk through quickly on how to start collecting and tracking data. (Production Coordinator)

+ Very good. It gave me some ideas and opened my eyes on some things that we should be doing and are not. (Production Coordinator)

- Could have been a 1/2 day seminar. (It was) confusing trying to follow along in the notebooks - more time spent turning pages than following concepts. (Production Engineer)

+ Very interesting. Good way of publicizing the benefits of the NSRP. (Production Engineer)

- I think more time should have been spent on the material presented in the morning (process studies, standards development, etc.) and less time on the structure of the NSRP. This stuff can easily be read and digested in a concise, succinct handout. I hoped there would be more discussion of how to use standards for cost estimating, particularly change orders, and how this concept can be “sold” to both the Manufacturing Division and/or the Client. (Estimating Analyst)

+ The bibliography material will be useful for current benchmarking initiatives. Good information. Certainly did not hurt. The NSRP bibliography is a good resource. (Estimating Analyst)

- (Need) a little more detail on the process standard to estimating standard routine, and the content of non-process time. (Industrial Engineering Technician)

+ Good for working level people. Need a higher level version for senior shipyard management. (Industrial Engineering Technician)

+ I usually get drowsy at these types of presentations, but it was interesting enough to keep me alert. Project Planning Supervisor)

+ was easy to stay up with. Kept my attention on what was discussed. Made me think about how we do and do not schedule work. Wish higher level management would have attended. Good. I not only benefited from the main topic, but learned a little bit about the NSRP that I never was clear on. (Industrial Engineer)

- I understand what improvements can be done, but the method for implementing was not clear. (Special Assistant for Work Control, Machine Shop)

+ Good background and interest, but I am not in a big position to make much of a difference. (Industrial Engineer)

- Interesting but not real applicable and useful to me for planning and scheduling machine shop repair work. (Machinist General Foreman)

- Slides shuffled too fast during explanation. Geared more for persons above my level. (Machine Shop Planner)

+ Very useful to me, very informative. Would like to attend SP-3, SP-8 meetings. (Industrial Engineer)

+ Good use of visual aids, as this material would be very dry without it. This was useful as general knowledge. (Nuclear Coordinator)

- This Workshop did-not apply much to my area of concerns. I am a supervisor in the machine shop planning/programming office, and I thought that the “planning” addressed is at too high a level to affect my efforts. (Supervisor Planning - Foreman)

- It would have been a little better to see actual schedule flow charts (old vs. new) with scheduling standards, and cost savings. (Supervisory Industrial Engineer)

+ Very good. I liked the overview of what NSRP is, and how it works. (Industrial Engineer)

- Perhaps more than a one-day Workshop - one designed for planners/schedulers - would be appropriate. (Industrial Engineer)

- Good information but could have more details on scheduling. (Industrial/Project Engineer)

-Very interesting, but probably can't use because of the Unions. (Production Controller)

- Maybe you could use color visual aids. (Supervisor Inspector)

+ (My shipyard) could use this concept. (Supervisor Inspector)

+ Good introduction to information that I had no idea existed. (Metal Inspector Supervisor)

+ Presented with humor and anecdotes which helped to keep the ball rolling. (Lead Workload/Workforce Analyst)

- Probably could have been directed with a large shipyard focus. (Lead Workload/Workforce Analyst)

This presentation, like most others, deals with the shop environment. Repair, my current field, needs information associated with the on-board environment. The portion regarding NSRP is a little long. (Manager Repair Support)

+ Very useful information presented in a clear manner. The Workshop as presented. is quite worthwhile. (Associate Administrator, Ship Construction and Operation)

+ Very informative for a first time attendee. (Manager On Block)

More samples of standards for various applications should be introduced. (Senior Staff Engineer, Production Services)

+ Workshop was very good. This topic is one that we are looking at. I gained several good ideas that we will be able to use in our shop. (Staff Engineer, Pipe Shop)

+ Very interesting. Possible application in our outfitting areas to reduce non-process time. (Assistant Manager Ground Outfitting)

+ Very well done. Very informative. I greatly enjoyed it. (Production Staff Engineer)

+ Should conduct additional Workshops. (Welding Engineer)

+ Would like to see more of this type Workshop. Well done. Informative. (Industrial Engineering Section Manager)

+ May not deal with current conditions (at our shipyard) but could be very useful. (I) was not aware of the widespread involvement of industry on these subjects. (Lead Industrial Engineer)

+ Presented material I was not aware was available. (Lead Industrial Engineer)

#### (C) Specific Comments on Potential Future Projects

+ More emphasis on projection of CAD data base evaluation of a system or detail with regard to cost. (Director of Engineering)

+ What does it take to support various functions in a shipyard, i.e., to support shop floor control you need engineers, information support, planners, etc. What is the up-front cost, and the total cost of support?

+ Evaluate overhead costs of implementing a program vs. payback. (Repair Coordinator)

+ Management accountability. (Central Planner)

+ Better communications. (General Supervisor)

+ More detailed trade information between shipyards. (General Supervisor)

+ (1) Shop floor control. (2) Automated timekeeping. (3) Hazardous material management and substitution. (Production Resources Officer)

+ Have individuals from Panels present (at the Workshops) as well. (Supervisor of Planning)

+ Include examples of foreign shipyard utilization of subject material. (Supervisory Manufacturing Engineer)

+ Use of composites for structural components. (Industrial Engineer)

+ Address how private shipyards make conversion from Naval to commercial work and compete with foreign yards. (Project Engineer)

+ What to do with manning in Naval Shipyard production shops for the short terms when there is no workload, i.e., rigging (feast or famine). (Industrial Engineer)

+ (1) Improved design of electrical/electronic equipment in regard to accessibility, installation removal, troubleshooting. (2) Improved design/increased use of amphenol connectors vice hard wiring connections. (Nuclear Director)

+ Put the studies into practice -do something! (Industrial Engineer)

+ Possibly a video tape describing some of the NSRP publications - could go to shipyards and get distributed. Those shipyards doing nuclear overhaul/construction often have difficulty communicating between the nuclear organizations and the non-nuclear groups. (Industrial Engineer)

+ (1) Use of water knife machine (PASER) for manufacturing components, rubber gaskets, fiberglass pieces, cutting gaskets, etc. It decreases hazwaste and material cost. (2) Epoxy coating procedures and processes, and powder coatings. (Shop Superintendent)

+ Need more information on personal computer scheduling. (Supervisor Scheduler)

+ Just-in time material support from originator through supply to the deck plates. (Planning Supervisor, Production)

+ Shop floor control implementation and integration. (Scheduling Supervisor)

+ How do we get past "Navy Tradition" and Government bureaucracy? (Industrial Engineer)

+ More information on the current happenings of the NSRP. (Industrial Engineer)

+ PROSHAPES robotics shape cutting system would be an excellent candidate for research and development. (Production Engineer)

+ (1) Survey/detailed study of work order systems. (2) Improved methods for multi-trade work sequencing and integration. (3) Manufacturing engineering. principal Planner)

+ Production and managing bodies must both see the same end result prior to the start. (Technical Planner)

+ A study making Naval shipyards more capable of pursuing commercial work. (Management Development Intern)

+ Implementation of a detailed shop floor control for painting - in order to track labor costs as well as material consumption in regards to EPA regulations. (Supervisor Shop Floor Control)

+ (1) Grit recovery, transfer, disposal. (2) Improved monitoring of airborne emissions to quantify more accurately breathable particles. (Senior Assistant Foreman Blast/Paint)

+ (1) Bar coding in-process material. (2) A better shop floor control system. (Production Coordinator)

+ Get the public shipyards more involved. (General Foreman)

+ Controlling costs. (Industrial Engineering Technician)

+ There's no hope. (Industrial Engineer)

+ Research on SKIM (ocean-going) craft and how they could be used for deployment. (Industrial/Project Engineer)

+ More investment in the worker, better means of communication between design management, and workforce. (Production Controller)

+ (1) How are employers (shipyards) dealing with the balance of jobs vs. efficiency? When we get better at workload forecasting, we won't need as big a workforce. Is there any move to find more work such as non-ship work? (2) Who at NavSea 07 is aware of this study (the content of this Workshop), and are they trying to factor it into the COSP and AIM? (3) Negotiating compromises with environmental agencies. We must have shipyards that are facing shutdown/reduction in work due to environmental constraints, similar to the timber industry and the spotted owl. Is anyone going to campaign for reduction in environmental controls to save jobs (minimize the work which we lose to foreign competition)? (Off-yard Projects Manager)

+ Continue with these types of Workshops to close the gap between private and Government agencies. (Industrial Engineering Technician)

- + Projects should include funding for presentations to shipyards at shipyards to educate more people within shipyards, private and public. (Head Support Systems & Facility Engineering)
- + Communications/satellite offices so that rework is not done at local sites. (Supervisor Elec/Elex)
- + White-collar work packaging for production. (Design - Mechanical)
- + Additional coverage of the quality aspects of shipbuilding, e.g., measurement, and tracking trend analysis. (Quality Assurance - Engineering)
- + Environmental issues, specifically (1) how to avoid or prevent chemical spills, and (2) how to keep shipbuilding jobs in America. (Industrial Engineering Technician)
- + Eliminate all U.S. Navy connections except for those yards that cannot operate without them as a customer. (Associate Administrator)
- + Conduct Workshops on various projects. (Welding Engineer)
- + Would like to see more of this type Workshop. (Industrial Engineering Manager)
- + Would like to see implementation of the various research on different Panels - seems to be a lot of wasted data: (Industrial Engineer)

## **(2) OVERALL RESULTS**

This series of Workshops was successful in presenting information on improved planning and shop loading in shipyard production shops to a good-sized segment of the shipyard community. In addition information about the NSRP and its accomplishments during the past fifteen years was made available to many shipyard people who had no previous knowledge of it. The Handout which each attendee received will be a source of information useful for many years. The Workshop Evaluation Sheet provided a sounding board for comments and ideas from interested and concerned shipyard people, as the information on the previous 10 pages of this Report will attest. Overall, this Workshop Project provided a valuable addition to the general body of knowledge in the shipyard community.

### **(3) CONCLUSIONS AND RECOMMENDATIONS**

#### **(A) Continue Workshops on NSRP Projects**

Workshops can serve as an effective vehicle for communicating information and ideas resulting from NSRP projects. When arranged on a no-cost basis for the attendees, and offered at several locations throughout the Country, Workshops can be a valuable and economical tool for spreading the word to interested shipyard personnel. Every NSRP project should consider the use of a Workshop to promote and explain the findings associated with it. Printed reports are necessary and valuable, but cannot take the place of face-to-face exchanges of information among concerned shipyard professionals.

#### **(B) Encourage Close Communications with Shipyard People at ALL Levels**

SPC Panel Chairpersons and Panel members should seize every opportunity for detailed and in-depth communications with shipyard people at all levels. The problem of gaining faithful and complete communications on matters of mutual interest is so large and difficult that it requires constant and intense treatment. This general concern is probably the MOST important challenge facing the NSRP, and the people who operate within this Program.

**NSRP Project 8-90-4**

**WORKSHOPS ON IMPROVED PLANNING AND SHOP LOADING  
IN SHIPYARD PRODUCTION SHOPS**

+ + +

**APPENDIX A**

**VIEWGRAPHS**

**PREPARED FOR THE WORKSHOPS**

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# **NATIONAL SHIPBUILDING RESEARCH PROGRAM ---**

## **WORKSHOP ON IMPROVED PLANNING AND SHOP LOADING IN SHIPYARD PRODUCTION SHOPS**

NSRP WORKSHOP '92

Slide 1

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## **MERCHANT MARINE ACT OF 1936**

**1970: MAJOR LEGISLATIVE  
AMENDMENT**

**GENERAL: 10-YEAR FEDERAL  
PROGRAM TO REBUILD THE  
AMERICAN MERCHANT MARINE**

**SPECIFIC: *ESTABLISH A  
COOPERATIVE RESEARCH  
PROGRAM***

NSRP WORKSHOP '92

Slide 2

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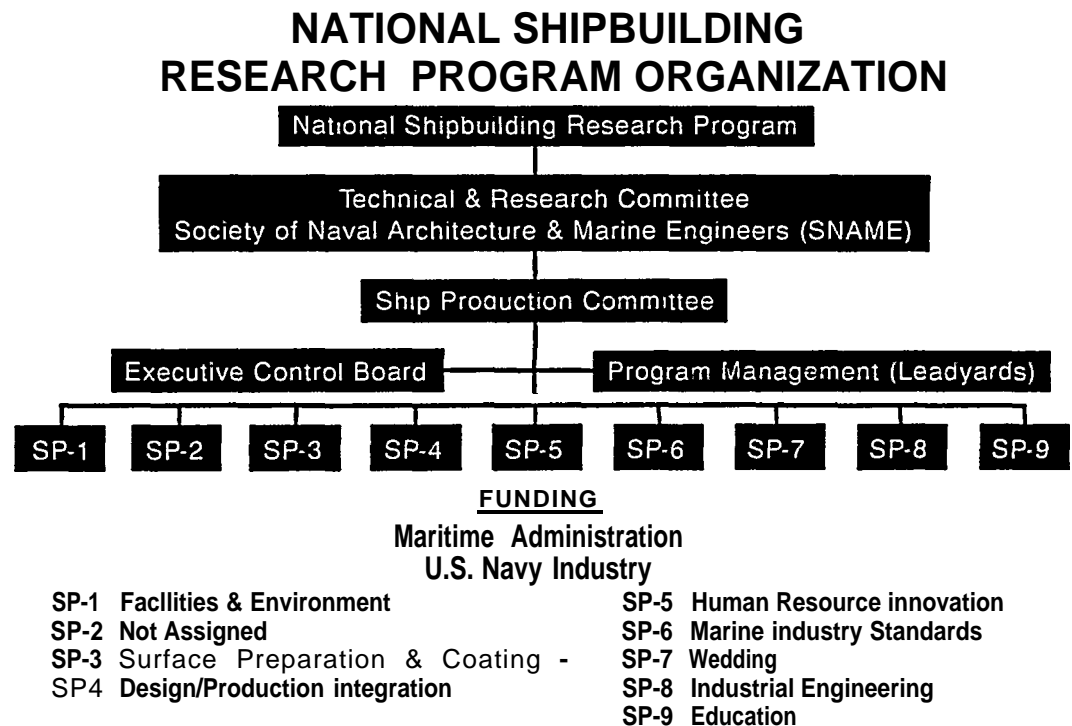
# COOPERATIVE RESEARCH PROGRAM

## THE NATIONAL SHIPBUILDING RESEARCH PROGRAM

### TECHNICAL MANAGEMENT BY THE MARITIME ADMINISTRATION *AND* THE SHIP PRODUCTION COMMITTEE OF SNAME

NSRP WORKSHOP '92

Slide 3



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# **INDUSTRIAL ENGINEERING ---**

**BIW BECAME THE 'HOST'**

**ATLANTA CONFERENCE -1970**

**TWO HIGH PRIORITY AREAS :**

**1- METHODS ENGINEERING/  
LABOR STANDARDS  
DEVELOPMENT**

**2- INCREASING MANAGEMENT  
GENERAL AWARENESS OF  
INDUSTRIAL ENGINEERING**

---

## **SHIPYARD SITUATION THEN :**

**LABOR EXPENDITURE COLLECTION**

**ESTIMATING PROCEDURES**

**SCHEDULING PRACTICES**

**PERFORMANCE MEASUREMENT**

---

# ELEMENTS OF PLANNING AND PRODUCTION CONTROL---

## PLANNING:

PREDICT WORK CONTENT AND  
PROVIDE SEQUENCE FOR  
PROJECT WORK ITEMS

## SCHEDULING:

APPLY **CALENDAR DATES** FOR  
ALL PROJECTS IN SHIPYARD

## PRODUCTION CONTROL:

DETERMINE WHAT /S TAKING PLACE,  
WHAT **SHOULD** BE TAKING PLACE,  
HOW TO MAKE THE TWO **MATCH**

---

# CONSIDER TWO 'PICTURES' ---

## SCATTER DIAGRAMS

### WORKLOAD PROJECTIONS

NSRP WORKSHOP '92

Slide 8

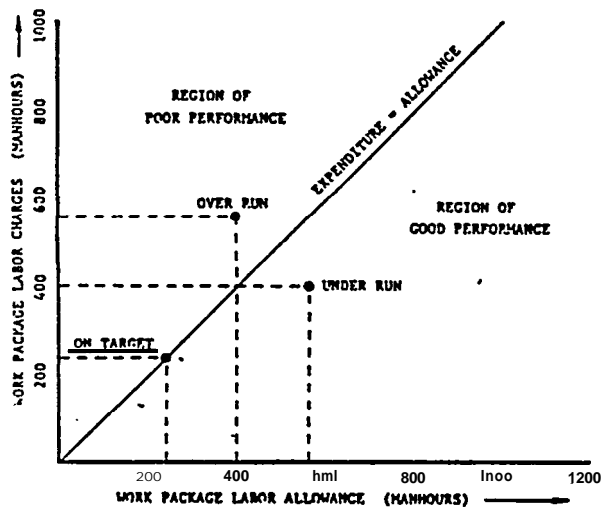


FIGURE 2-1 SCATTER  
DIAGRAM - A TOOL FOR  
MONITORING PERFORMANCE

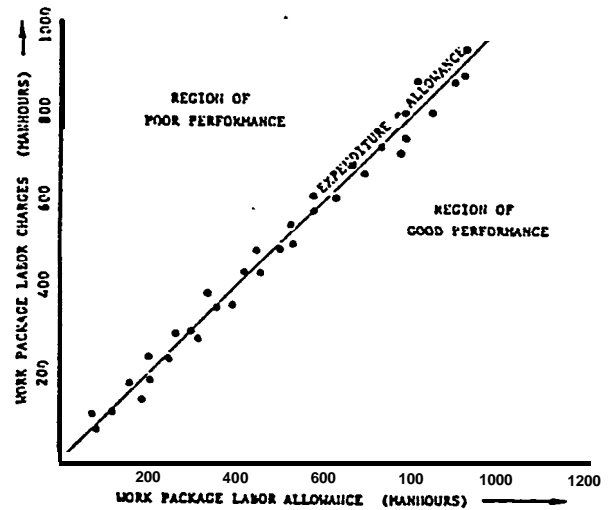


FIGURE 2-2: SCATTER  
DIAGRAM - GOOD  
PERFORMANCE

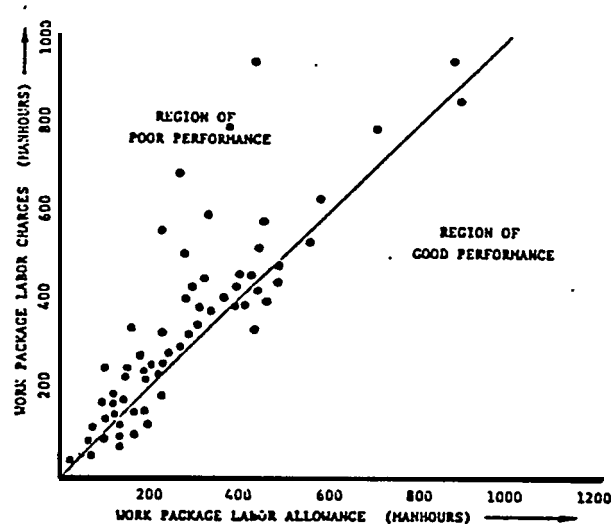


FIGURE 2.3: SCATTER  
DIAGRAM - THREE  
ACTUAL SHOPS

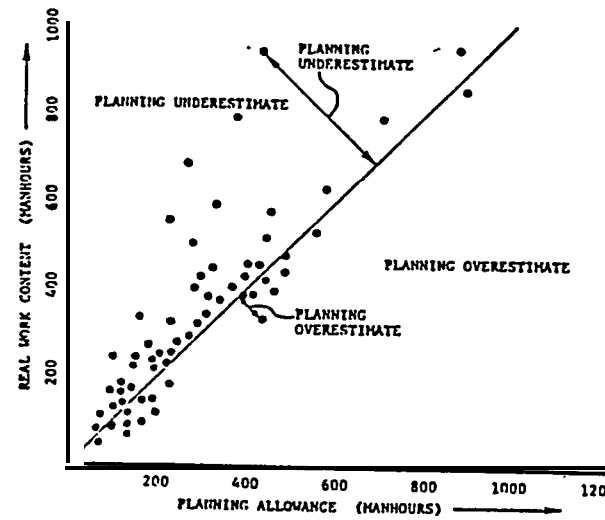


FIGURE 2-4: SCATTER  
DIAGRAM - A VIEW OF  
PLANNING

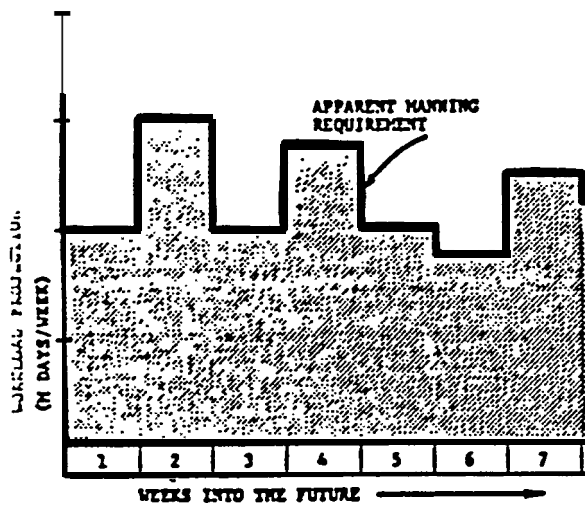


FIGURE 2-5: WORKLOAD PRO-  
JECTION FROM WORK PACKAGE  
ALLOWANCES

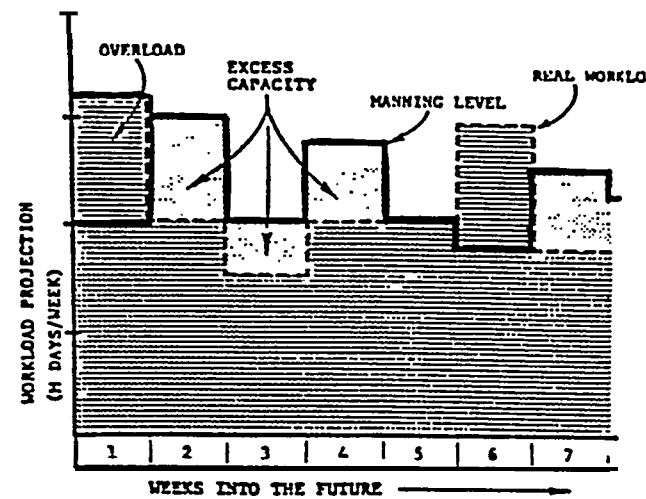


FIGURE 2-6: WORKLOAD  
PROJECTION - ACTUAL VS  
PLANNED

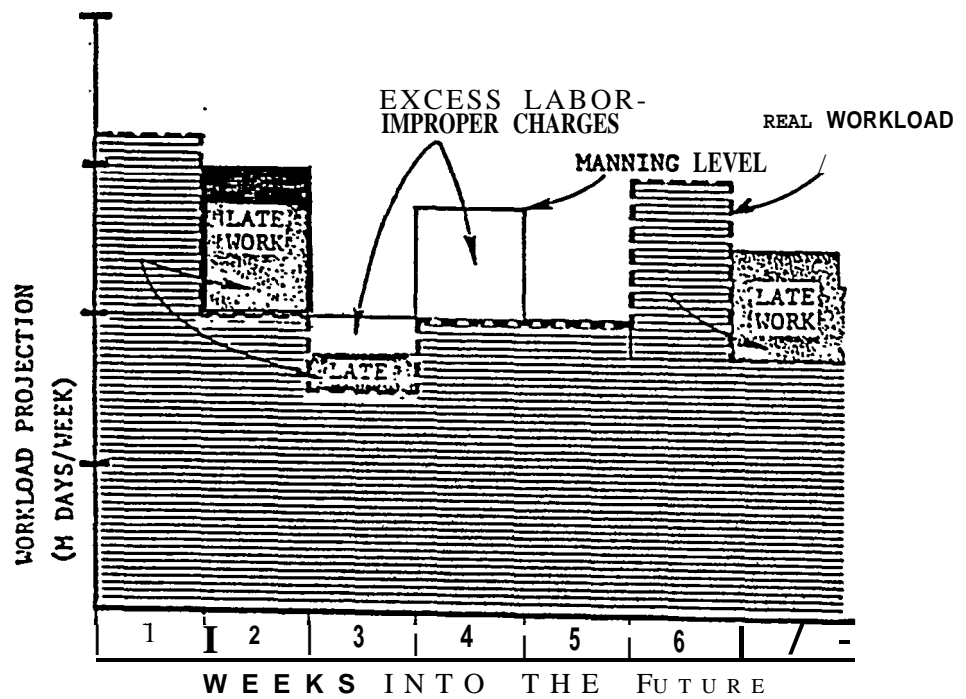


FIGURE 2-7: WORKLOAD PROJECTION  
IMPACT OF UNRELIABLE ALLOWANCES

2-9

## IMPROVEMENT POSSIBILITIES ---

TIME

FACILITIES

MATERIAL

MANPOWER

---

## THE KEY INGREDIENT ---

INFORMATION ON WHICH TO  
PREDICT THE  
REAL WORK CONTENT  
OF PRODUCTION JOBS, AND  
HOW LONG IT WILL TAKE  
TO PERFORM THEM

---

## SP-8 POSTURE --

GENERATE 'MOST' STANDARD DATA  
SHARE AMONG SHIPYARDS  
IMPROVE BASIC PROCESSES AND  
METHODS

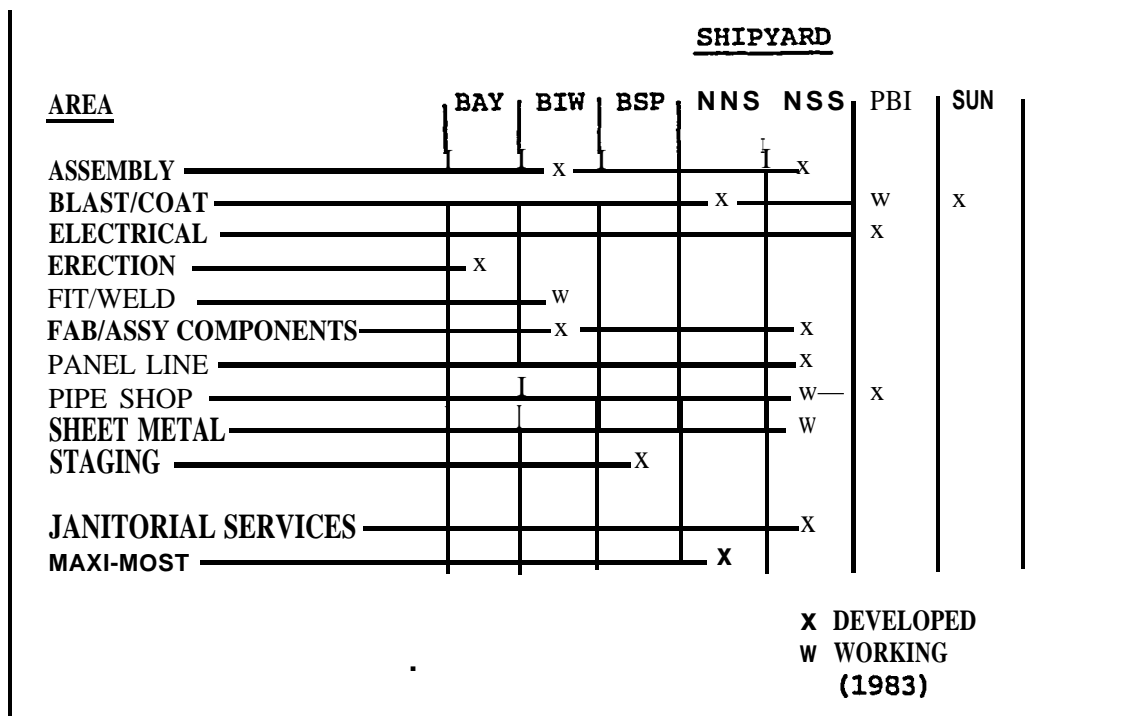
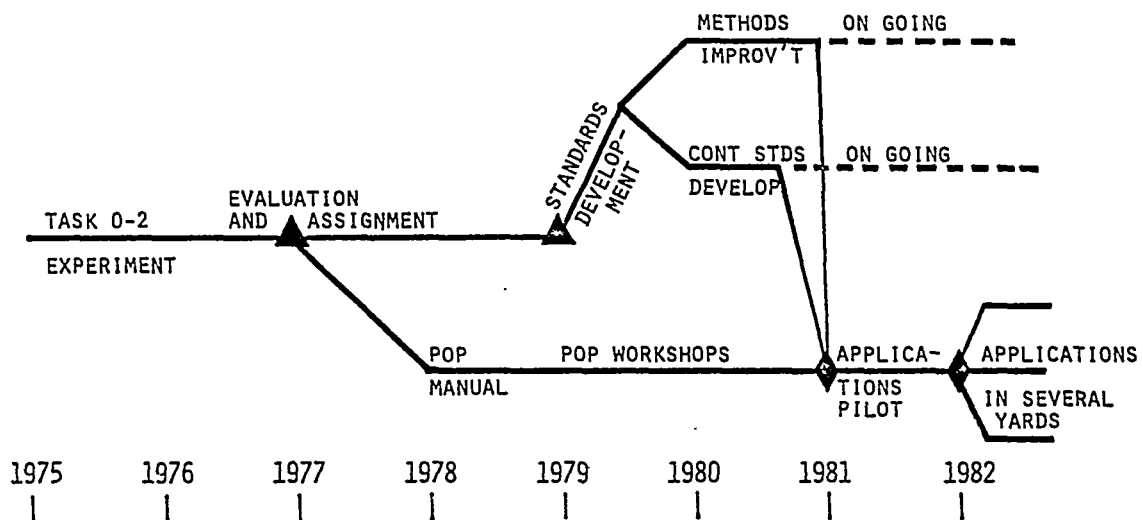


FIGURE 4-1: MOST DATA DEVELOPMENT AREAS



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## **ENGINEERED LABOR STANDARDS ---**

### **A FAMILY OF TOOLS**

**NOT A SINGLE DETERMINATION OF  
PROCESS TIME ALL BY ITSELF,  
BUT A SET OF DETERMINATIONS  
OVER FIVE LEVELS FOR USE BY  
ALL SHIPYARD GROUPS AND  
INTERESTS**

NSRP WORKSHOP '92

Slide 12

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## **LABOR STANDARDS HIERARCHY ---**

COST ESTIMATING STANDARD  
PLANNING STANDARD  
SCHEDULING STANDARD  
PRODUCTION STANDARD  
PROCESS STANDARD

NSRP WORKSHOP '92

Slide 13

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## **PROCESS STANDARDS ---**

COVER A SINGLE WORK PROCESS

USE FOR PROCESS IMPROVEMENTS

USE AS BUILDING BLOCK FOR HIGHER  
LEVEL STANDARDS

---

## **PRODUCTION STANDARDS ---**

COVER SEVERAL PROCESSES OF A  
PRODUCTION JOB

USE FOR PRODUCTIVITY  
MEASUREMENTS

USE FOR METHODS IMPROVEMENTS

BUILDING BLOCK FOR HIGHER LEVEL  
STANDARDS

---

## SCHEDULING STANDARDS ---

THE LOWEST LEVEL TO REFLECT  
**REAL TIME**

USE FOR WORK CENTER BUDGETS

USE FOR WORK CENTER LOADING

BUILDING BLOCK FOR HIGHER LEVEL  
STANDARDS

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Slide 16

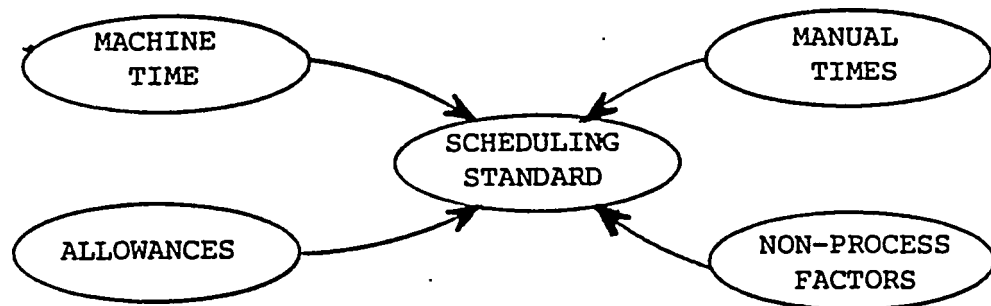


FIGURE 3-17: ELEMENTS OF A SCHEDULING STANDARD

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## PLANNING STANDARDS ---

ALSO IN **REAL TIME**

USE FOR WORK PACKAGE BUDGETS

USE FOR LOADING A SHOP

USE DURING SCHEDULE  
DEVELOPMENT

---

## COST ESTIMATING STANDARDS ---

ALSO IN **REAL TIME**

USE FOR MILESTONE AND KEY  
EVENTS PLANNING / SEQUENCING

USE FOR ESTIMATING NEW SHIP  
COSTS, CHANGE ORDER COSTS,  
OVERALL SYSTEM COSTS, AND FOR  
PREPARING BIDS

---

## **THE REAL TIME ASPECT---**

REAL TIME HAS TWO COMPONENTS:

PROCESS TIME, AND

NON-PROCESS TIME

---

## **PROCESS TIME ---**

SOMETIMES CALLED 'LEVEL TIME' ---

THE TIME SPENT CARRYING OUT THE  
BASIC PROCESS -

FITTING, GRINDING, WELDING,  
BENDING, SAWING, ETC.

---

## **NON-PROCESS TIME ---**

**TIME SPENT** IN ACTIVITIES OUTSIDE  
OF THE BASIC PROCESS, SUCH  
AS PERSONAL TIME, WAITING  
FOR MATERIAL, READING WORK  
INSTRUCTIONS, EQUIPMENT  
BREAKDOWN DELAYS, CRANE  
DELAYS, OTHER 'LOST' TIME . . .  
SOMETIMES HANDLED BY MEANS  
OF A UTILIZATION FACTOR,  
EFFICIENCY FACTOR, ETC.

---

## **UNIQUE SITUATION IN SHIPYARDS ---**

**OTHER INDUSTRIES HAVE A HIGH**  
VOLUME OF HIGHLY REPETITIVE  
WORK ITEMS

SHIPYARDS OFTEN FACE ONE-TIME  
WORK ITEMS WITH A LARGE  
AMOUNT OF NON-PROCESS  
ACTIVITY

---

## SOURCE OF PROCESS TIME ---

USUALLY FROM ENGINEERED  
STANDARD DATA -

MOST  
COMPUTER MOST  
WOFAC  
PUBLISHED LITERATURE  
COMBINATIONS OF THE ABOVE

---

## SOURCE OF NON-PROCESS TIME ---

OFTEN HANDLED BY UTILIZATION  
**FACTOR, PERFORMANCE** RATE,  
AND EFFICIENCY FACTOR IN  
OTHER INDUSTRIES

SHIPYARD NEEDS BEST SATISFIED BY  
**WORK SAMPLING**

---

## **DEVELOPMENT OF STANDARDS FAMILY ---**

FROM THE BOTTOM UP

USUALLY BY INDUSTRIAL ENGINEERS  
WORKING CLOSELY WITH  
PRODUCTION PEOPLE

**NOTE THE STANDARDS THAT ARE IN  
REAL TIME**

**THESE ARE THE STANDARDS THAT  
ARE USED BY PLANNERS,  
SCHEDULERS, AND MANAGEMENT**

---

## **DO-IT-YOURSELF PYRAMID ---**

ILLUSTRATES THE FAMILY OF  
STANDARDS,

THE USE OF EACH LEVEL OF  
STANDARD, AND

WHO USES EACH LEVEL OF  
STANDARD

---

## **SCHEDULING STANDARDS PILOT PROJECT**

CARRIED OUT 10-YEARS AGO

PETERSON BUILDERS, INC. WAS THE  
HOST SHIPYARD.

PROJECT DONE IN PIPE FABRICATION  
SHOP

---

## **MOST DATA AVAILABLE AT PBI ---**

SEVERAL SHIPYARDS HAD  
DEVELOPED WORK MANAGEMENT  
MANUALS CONTAINING MOST  
STANDARD DATA

NO SHIPYARD HAD TRIED TO APPLY  
'MOST DATA - EVEN FOR PROCESS  
IMPROVEMENTS

APPLICATION SEEMED APPROPRIATE  
BEFORE ANY MORE DATA WAS  
DEVELOPED . . .

---

**DESIRE WAS FOR APPLICATION BEYOND  
JUST PROCESS IMPROVEMENTS ---**

**DEVELOP SCHEDULING STANDARDS  
FOR USE IN PLANNING SHOP WORK  
AND IN LOADING THE SHOP WORK  
CENTERS**

**WORK MANAGEMENT MANUALS  
WOULD BE LIMITED TO PROCESS  
IMPROVEMENTS . . .**

NSRP WORKSHOP '92

Slide 29

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**MOST DATA IN HAND FOR THE PIPE  
FABRICATION OPERATIONS AT PBI ---**

**PLAN WAS TO DETERMINE LEVEL  
TIMES FOR SELECTED GROUP OF  
WORK ORDERS**

**CONDUCT WORK SAMPLING TO FIND  
NON-PROCESS COMPONENT OF  
TOTAL TIME**

**CALCULATE SCHEDULING STANDARD  
HOURS (LEVEL TIMES INCREASED  
BY NON-PROCESS FACTOR)**

NSRP WORKSHOP '92

Slide 30

BASELINE OF PERFORMANCE  
ESTABLISHED AS A REFERENCE  
FOR LATER ANALYSES ---

---

## **SEPARATE COLLECTION OF WORKER TIME**

TIME CARD DATA NOT SATISFACTORY

TIME INCREMENTS ENTERED BY THE  
WORKER ON A SEPARATE DATA  
SHEET IN 15-MINUTE INCREMENTS

THIS PRACTICE WORKED WELL, AND  
DID NOT IMPOSE A BURDEN ON THE  
WORKERS

# **WORK SAMPLING REVEALED BOTH PROCESS AND NON-PROCESS ACTIVITIES -**

## **PROCESS TIME INCLUDED:**

SAWING, END PREP, BENDING, FIT  
AND TACK, WELDING, LAYOUT  
AND MEASURE, BRAZING,  
INSPECTION, WAREHOUSING,  
CLEANING PIPE, BENCH WORK,  
ETC.

---

NON-PROCESS TIME INCLUDED BOTH  
UNAVOIDABLE DELAYS AND OTHER NON-  
PROCESS ACTIVITIES ---

RECEIVING INSTRUCTIONS,  
INSTRUCTING, READING  
PROCEDURES, CLEAN UP

GETTING TOOLS AND RETURN,  
LOOKING FOR MATERIAL, POWER  
OUTAGE, WAIT FOR MACHINE,  
EQUIPMENT BREAKDOWN, WAIT  
FOR SAW, PERSONAL, IDLE, ETC.

---

## WORK SAMPLING CONDUCTED DURING A TWO-WEEK PERIOD ---

DATA SETTLED DOWN AFTER ABOUT TWO WEEKS, AND DISCLOSED THE RATIO BETWEEN

- > PROCESS ACTIVITIES AND
- > NON-PROCESS ACTIVITIES

---

## ONCE BASELINE WAS ESTABLISHED ---

CONDUCT TEST INVOLVING 2-WEEKS WORTH OF WORK ON SELECTED WORK ORDERS

COMPARE ACTUAL DATA AGAINST SCHEDULING STANDARDS MADE FROM BASIC MOST DATA AND PROCESS / NON-PROCESS RATIO

RESULTS SHOWED 'PROMISE' AS PREDICTION TOOL, BUT EFFORT TO USE MOST DATA WAS **RIGOROUS**

---

## DEVELOP 'CLASSIFICATION MOST' --- -

AN EASIER WAY TO USE MOST DATA  
WITH MINIMAL LOSS IN ACCURACY  
FOR USE WITH SCHEDULING  
STANDARD DEVELOPMENT

CLASSIFICATION MOST USED FOR THE  
BALANCE OF THE PROJECT

TWO MORE TESTING PERIODS ---

RESULTS STILL 'PROMISING' . . .

---

## SSPP RESULTS WERE:

SCHEDULING STANDARDS COULD  
PREDICT 'WILL COST' HOURS

SHOP LOADING IMPROVEMENTS  
WERE ABOUT 33%

CLASSIFICATION MOST MUCH **EASIER**  
TO USE THAN BASIC MOST DATA,  
AND STILL PRODUCED  
ACCEPTABLE LEVEL TIMES

---

## **ANOTHER CONCLUSION FROM SSPP ---**

IF CLASSIFICATION MOST IS USABLE,  
WHY NOT DEVELOP SIMILAR DATA  
FROM CLASSIFICATION MOST OR  
FROM ACTUAL PERFORMANCE  
MEASUREMENTS USING  
STATISTICALLY BASED FORMULAS

COMPANION STUDY DEMONSTRATED  
THAT THIS APPROACH MIGHT BE  
PRACTICAL . . .

---

## **COMPANION STUDY RESULTS ---**

FORMULAS COULD BE DEVELOPED  
FROM CLASSIFICATION MOST, AND  
FROM RAW PERFORMANCE DATA:

REAL TIME = A (PIPE DIA) + B (# PCS)  
+ C (# JOINTS) + D (# BENDS)

NOT 'RIGOROUS', BUT 'INVITING' . . .

---

## **SSPP RESULTS SUGGESTED TRANSFER OF SCHEDULING STANDARD DATA MIGHT BE PRACTICAL - - -**

**TRANSFER** PROJECT INITIATED:  
FIVE BASIC INTENTIONS . . .

---

CONVERT BASIC MOST DATA INTO  
CLASSIFICATION MOST ---

DONE AT PBI IN PIPE FAB AREA

DONE AT NASSCO IN SHEETMETAL  
AREA

ASSESS EASE / DIFFICULTY OF  
CONVERSION

**DEVELOP FORMULAS FROM CLASSIFICATION  
MOST ---**

DO AT PBI USING NASSCO  
CLASSIFICATION MOST IN  
SHEETMETAL AREA

DO AT ISD USING PBI CLASSIFICATION  
MOST IN PIPE FABRICATION AREA

ASSESS EASE / DIFFICULTY OF  
DEVELOPMENT

---

**DEVELOP FORMULAS FROM RAW  
PERFORMANCE DATA (STATISTICALLY) ---**

DO AT PBI IN SHEETMETAL AREA

DO AT ISD IN PIPE FABRICATION AREA

ASSESS EASE / DIFFICULTY OF  
DEVELOPMENT

---

APPLY PREDICTIONS FROM EACH SOURCE,  
AND COMPARE RESULTS ---

DO AT PBI IN **SHEETMETAL AREA**

DO AT ISD IN PIPE FABRICATION AREA

MAKE COMPARISON

---

**RESULTS OF** TRANSFER STUDY WERE ---

PBI RESULTS WERE FAVORABLE

ISD RESULTS WERE MARGINAL TO  
DOUBTFUL

OVERALL RESULTS PROMPTED A  
RIGOROUS STUDY OF DEVELOPING  
SCHEDULING STANDARD DATA  
THROUGH REGRESSION ANALYSIS  
OF RAW PERFORMANCE DATA

**APPLICATION GUIDE PREPARED . . .**

---

## **WHERE ARE WE NOW? ? ?**

NASSCO INDUSTRIAL ENGINEERING  
GROUP REDUCED - MINIMAL  
ACTIVITY SINCE TRANSFER STUDY

ISD EFFORTS IN SCHEDULING  
STANDARDS AREA SMALL TO NONE

PBI PIPE FABRICATION SHOP EFFORT  
CONTINUING - NOW REFINED AND  
WORKING EXTREMELY WELL

**PBI EFFORTS IN OTHER SHOPS ALSO  
CONTINUING -**

---

## **CURRENT SITUATION AT PBI IN PIPE FABRICATION AREA ---**

SAMPLE OF COMPUTERIZED  
ARRANGEMENT OF TODAY ---

---

## **AN APPROACH TO IMPROVED PLANNING AND SHOP LOADING ---**

### **ASSIGN PEOPLE :**

**ONE OR TWO AT FIRST  
ENGINEERING BACKGROUND  
GOOD RELATIONSHIP WITH  
PRODUCTION PEOPLE  
REPORT TO REASONABLY HIGH  
LEVEL OF SHIPYARD  
MANAGEMENT**

---

### **TRAIN PEOPLE:**

**INDUSTRIAL ENGINEERING  
FUNDAMENTALS  
RELATED ACCOMPLISHMENTS  
OVERALL INTENTIONS  
ULTIMATE POSSIBILITIES  
3 TO 4 WEEKS**

---

## **SELECT INITIAL AREA:**

SMALL

MANAGEABLE

PIPE SHOP, SHEETMETAL SHOP,  
MACHINE SHOP, OR PORTION OF A  
LARGE SHOP

PERHAPS AREA WHERE ENGINEERED  
STANDARD DATA IS ALREADY  
AVAILABLE

---

## **INVOLVE PRODUCTION PEOPLE:**

TREAT AS VITAL PARTS OF **THE**  
PROGRAM, WHICH THEY **ARE**

KEEP THEM INFORMED OF  
INTENTIONS AND PROGRESS ON A  
REGULAR BASIS

THEIR COOPERATION AND SUPPORT  
**IS ABSOLUTELY ESSENTIAL** TO  
SUCCESS

---

## **DEVELOP / OBTAIN ENGINEERED .** **STANDARD DATA:**

PROCESS AND NON-PROCESS  
COVER 85% OF THE WORK IN THE  
AREA SELECTED  
POSSIBLE SOURCES . . .

---

## **POSSIBLE SOURCES:**

DETAILED MOST OR WOFAC  
COMPUTER MOST  
CLASSIFICATION MOST  
FORMULAS DEVELOPED FROM  
PERFORMANCE MEASUREMENTS  
PUBLISHED LITERATURE  
INDEPENDENT DEVELOPMENT  
COMBINATIONS OF THE ABOVE

---

NON-PROCESS FACTORS MUST BE -  
DEVELOPED ---

WORK SAMPLING IS EASY AND  
EFFICIENT

SAMPLE ACTIVITIES DURING RANDOM  
5 - MINUTE PERIODS OUT OF EACH  
HOUR

2-WEEKS' WORTH OF WORK  
SAMPLING DATA SHOULD BE  
ADEQUATE, OR UNTIL DATA  
'SETTLES DOWN'

---

**ESTABLISH BASELINE DATA:**

MEASURE PRESENT PERFORMANCE

**AVOID DISTORTED DATA, SUCH AS  
THE 'HAWTHORN EFFECT'**

**SET BASELINE DATA ASIDE FOR  
LATER USE IN ANALYZING  
PROGRESS**

---

## **ADJUST LOADING:**

ASSESS LOADING USING SCHEDULING  
STANDARDS

LOAD TO 100-110% CAPACITY

---

## **MEASURE RESULTS:**

USE THE SAME YARDSTICK

IDENTIFY PROBLEM AREAS

RESOLVE PROBLEMS

CONTINUE AS LONG AS ADVANTAGES  
OUTWEIGH THE COSTS OF  
RUNNING THE PROGRAM

**NSRP Project 8-90-4**

**WORKSHOPS ON IMPROVED PLANNING AND SHOP LOADING  
IN SHIPYARD PRODUCTION SHOPS**

+ + +

**APPENDIX B**

**CONTENTS OF  
PROMOTIONAL BROCHURE**

SHIP PRODUCTION COMMITTEE  
FACILITIES AND ENVIRONMENTAL EFFECTS  
SURFACE PREPARATION AND COATINGS  
DESIGN/PRODUCTION INTEGRATION  
HUMAN RESOURCE INNOVATION  
MARINE INDUSTRY STANDARDS  
WELDING  
INDUSTRIAL ENGINEERING  
EDUCATION

**THE NATIONAL  
SHIPBUILDING  
RESEARCH  
PROGRAM**

**A ONEDAY  
WORKSHOP**

---

on

**IMPROVED PLANNING**

**AND**

**SHOP LOADING**

**IN**

**SHIPYARD PRODUCTION  
SHOPS**

will be conducted at

**SEVERAL LOCATIONS**

during the

**FALL of 1992**



Sponsored by  
SNAME SPC PANEL SP-8  
on  
INDUSTRIAL ENGINEERING

## BACKGROUND

---

The process of planning and scheduling work in a shipyard production shop requires a PREDICTION of how much REAL TIME will be consumed by a worker (or by a group of workers) in accomplishing an individual work package. On the surface this sounds fairly simple, and yet the process constitutes one of the more difficult tasks in managing and controlling shipyard work. This is because the PREDICTION element has been so uncertain in actual practice.

Several NSRP projects have studied this problem area over the past 10 years. The growing body of knowledge shows promise of being able to resolve the prediction dilemma once and for all. Techniques for the generation and application of REAL TIME scheduling standards (a particular type of labor standards) have been developed and used by at least one shipyard with **impressive** results.

## OBJECTIVE

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The WORKSHOP will discuss the several NSRP projects that have been carried out in this area, leading to a better understanding of the techniques currently being employed with great success in a shipyard pipe fabrication shop.

The WORKSHOP will cover:

- (a) the generation of formulas from actual in-house performance data for use in predicting production performance
- (b) the use of a labor standards database augmented by in-house development of non-process factors for production work areas; and
- (c) the application of (a) and (b) above for planning and scheduling production work at the work package level in REAL TIME.

## WORKSHOP SEGMENTS

---

HOURL 1- Brief description of the NSRP, followed by introduction of a labor standards hierarchy, with emphasis on SCHEDULING STANDARDS that are constructed in REAL TIME.

HOURL 2- Explanation of the Scheduling Standards Pilot Project (1982) that was carried out at Peterson Builders, Inc.

HOURL 3- Introduction of techniques for developing Scheduling Standards, and the concept of sharing data among shipyards.

HOURL 4- Detailed discussion of how to develop and apply Scheduling Standards, along with the findings of previous projects in this area.

HOURL 5- Discussion of the Application Guide for Developing Scheduling Standards using Regression Analysis, prepared as part of an NSRP project.

HOURL 6- More detailed explanation of the NSRP, its structure, panels, functions, projects and participants, leading to a better understanding of this on-going research effort. (This segment will be offered last so that those who wish may leave early.)

## ADMINISTRATIVE DETAILS

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REGISTRATION FEE NONE.

STARTING TIME 8:30 A.M.

CREATURE COMFORT Coffee will be provided in the morning, and cold sod a/juices in the afternoon. A no-host luncheon will be available for the attendees (at their expense).

HANDOUT: Each attendee will receive a complete set of WORKSHOP materials for immediate use, and as personal reference material in the future.

MISCELLANEOUS: There will be adequate time for questions, and for discussion of related topics. Each attendee will be requested to complete a questionnaire covering WORKSHOP effectiveness.

## DATES AND PLACES

The WORKSHOP will be conducted at the following locations on the dates indicated:

- OCT 8 - STURGEON BAY, WI**  
Cornerstone Conference Center  
222 N. 3rd Avenue
- OCT 13 - BALTIMORE, MD**  
Ramada Inn, Towson - North  
Loch Raven Exit 29 off I-695
- NOV 2 - NORFOLK, VA**  
Holiday Inn, Portsmouth - Waterfront  
8 Crawford Parkway
- NOV 5 - PORTSMOUTH, NH**  
Sise Inn  
40 Court Street
- NOV 12 - BREMERTON, WA**  
Puget Sound Naval Shipyard  
Officer's Club - Fleet Room
- NOV 17 - VALLEJO, CA**  
Holiday Inn, Marine World Africa USA  
1000 Fairgrounds, I-80 Exit 37
- DEC 2 - SAN DIEGO, CA**  
Radisson Hotel, Harbor View  
1646 Front Street
- DEC 8 - PASCAGOULA, MS**  
La Font Inn  
Highway 90 East
- DEC 10 - HOUSTON, TX \***  
Holiday Inn, Channelview - East Belt  
15157 I-10 East Channelview
- JAN 6 - HONOLULU, HI \***  
Best Western The Plaza Hotel Intl Airport  
3253 N. Nimitz Highway

\* If there is sufficient interest at these locations.

- - - PLEASE REGISTER EARLY - - -

This will allow us to firm up all of the necessary administrative arrangements for each WORKSHOP. Registrants will be notified individually of any changes in the above dates or places.

## HOW TO REGISTER

You are invited to attend this WORKSHOP. Just enter the following information on this tear-off sheet and mail it to the address shown below.

Name

Address

City

State

Zip

( )

Phone

Position

Your choice of date and location:

- ☐ OCT 8- Sturgeon Bay, WI  
☐ OCT 13- Baltimore, MD  
☐ NOV 2- Norfolk, VA  
☐ NOV 5- Portsmouth, NH  
☐ NOV 12- Bremerton, WA  
☐ NOV 17- Vallejo, CA  
☐ DEC 2- San Diego, CA  
☐ DEC 8- Pascagoula, MS  
☐ DEC 10- Houston, TX \*  
☐ JAN 6- Honolulu, HI \*

\* If there is sufficient interest.

## MAIL YOUR REGISTRATION TO:

RODNEY A. ROBINSON  
R-P-M AND ASSOCIATES, INC.  
POST OFFICE BOX 9  
GREENLAND, NEW HAMPSHIRE 03840

## THE WORKSHOP LEADER

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Mr. Rodney A. Robinson has been associated with the NSRP for 15 years, carrying out several projects in the areas of Facilities and Environmental Effects, Surface Preparation and Coatings, Human Resource Innovation, and principally Industrial Engineering. He is a staunch and often outspoken advocate of APPLYING the favorable ideas uncovered through NSRP projects. He is Vice President of Robinson-Page-McDonough and Associates, Inc., a small consulting firm in New Hampshire

Mr. Robinson has spent most of his professional career as a nuclear engineer in the Navy Nuclear Propulsion Program, where he worked under Admiral H. G. Rickover for nearly 25 years. He was head nuclear engineer at the Portsmouth Naval Shipyard and later became the first civilian nuclear engineering manager in the Program. His career spans virtually all of the nuclear submarine designs from NAUTILUS up to the OHIO class ships.

The particular subject matter of this WORKSHOP had its origin in a project managed by Mr. Robinson at Peterson Builders, Inc., Sturgeon Bay, WI some 12 years ago. He has been a part of several follow-on projects conducted there since that time. He has been an interested supporter of the continuing in-house efforts at PBI to further improve on the planning and scheduling of work packages in the pipe fabrication area. This effort has yielded a capability for predicting the REAL TIME needed to accomplish an individual work package that is probably unique in the shipyard industry today.

**NSRP Project 8-90-4**

**WORKSHOPS ON IMPROVED PLANNING AND SHOP LOADING  
IN SHIPYARD PRODUCTION SHOPS**

+ + +

**APPENDIX C**

**EVALUATION SHEET**

**WORKSHOP ON IMPROVED PLANNING AND SHOP LOADING -  
IN SHIPYARD PRODUCTION SHOPS**

**EVALUATION SHEET**

Date \_\_\_\_\_

On the manner in which the material was presented:

- | <u><b>Speed</b></u>                  | <u><b>Visual Aids</b></u>          | <u><b>Class Time</b></u>             |
|--------------------------------------|------------------------------------|--------------------------------------|
| <input type="checkbox"/> Too fast    | <input type="checkbox"/> Clear     | <input type="checkbox"/> Too short   |
| <input type="checkbox"/> Too Slow    | <input type="checkbox"/> Confusing | <input type="checkbox"/> Too long    |
| <input type="checkbox"/> About right | <input type="checkbox"/> Need more | <input type="checkbox"/> About right |

Comments:

On the material itself

- | <u><b>Organization</b></u>         | <u><b>Content</b></u>                        | <u><b>Usefulness</b></u>                        |
|------------------------------------|--|---|
| <input type="checkbox"/> Clear     | <input type="checkbox"/> Too general         | <input type="checkbox"/> Useful to you          |
| <input type="checkbox"/> Confusing | <input type="checkbox"/> Too specific        | <input type="checkbox"/> Not useful to you      |
| <input type="checkbox"/> Mixed     | <input type="checkbox"/> Need more (explain) | <input type="checkbox"/> Useful to others (who) |

Comments:

Overall impression of the Workshop:

Please add your suggestions and recommendations for future projects that you feel might help to improve the shipbuilding industry

Shipyards/Organizations \_\_\_\_\_

Position/Title \_\_\_\_\_

**NSRP Project 8-90-4**

**WORKSHOPS ON IMPROVED PLANNING AND SHOP LOADING  
IN SHIPYARD PRODUCTION SHOPS**

+ + +

**APPENDIX D**

**1992 WORKSHOP  
ATTENDANCE PROFILE**

## 1992 WORKSHOP ATTENDANCE PROFILE

\* In attendance, with advance registration.

\*\* In attendance, but did not register in advance.

Remainder registered in advance but did not attend.

STURGEON BAY, WI- 08 Oct 1992:29 registered; 22 actual attendees

Asbury, Mark*	PBI	Mfg Mgr
Borkovetz, Jerry	PBI	Gen Supv, Carpentry/Joiner
Diedrick Doug*	PBI	Ind Engr
Daul, Tom	PBI	Scheduling
Flauger, John*	PBI	Gen Supv, Elec
Folz, Darrold *	PBI	Mgr Ind Engrg
Gordon, Jeff*	PBI	Test, Trials, Warranty Mgr
Gordon, Howie *	PBI	Gen Supv, Hull Install'n
Gordon, Jim*	PBI	Engrg Supv
Hanson,Bill*	PBI	Gen Supv, Welding
Hasenjager, Leon*	PBI	Gen Supv, Sheet Metal
Hornick, Ron*	Marinette Marine	Pipe/Mach Supt
Klaubauf Dan*	PBI	Planner
Kressig, Dan	PBI	Human Resources
McKinney, Larry*	PBI	Mach Outfit Mgr
Mueller, Ed*	PBI	Shop Planner, Mach
Neinas, Dale*	PBI	Shop Planner, Piping
Nelson, Tim*	Palmer Johnson	Design Coord
none given *	Palmer Johnson	Prod Mgr
Olsen, Mike*	PBI	Planner - Structural
Peterson Brian	PBI	Accounting
Propson, Steve*	PBI	Hull Structural Mgr
Schauske, Jon*	Bay Ship	Prod Mgr
Schinkten Mike	PBI	Engrg Design Mgr
Schroeder, Karl *	Bay Ship	Repair Coord, Contract Serv
Seiler, Rick	PBI	Accounting
Symanski, Gary	PBI	Gen Supv, Paint
Thomas, Georg *	PBI	Engrg Mgr
Yunk Jerry*	PBI	Gen Supv, Plate/Fab

BALTIMORE, MD -13 Oct 1992:7 registered; 8 actual attendees

Billings, Kent S. *	<b>Beth Steel - SP</b>	<b>Senior Planner</b>
Bone, Susan J. *	NavSea 0724	Supv Ind Engr
Fent, Dick **	USCG Yard	Prod Supt
Fisher, Fred W. *	USCG Yard	Chief Plan/Sched Div
<b>Jenkins, Richard *</b>	<b>USCG Yard</b>	<b>Gen Foreman, Pipefitter</b>
<b>Karlson, Edward S.</b>	<b>MarAd</b>	<b>Chief, Div of Prod</b>

Miller, Alex *	Beth Steel - SP	Project Planner
Petagno, Nick *	USCG Yard	Mechanical Supt
Van Suiterdale, Dick **	USCG Yard	Chief Engrg Div

**NORFOLK, VA - 02 Nov 1992: 17 registered; 12 actual attendees**

<b>Eight Attendees - 8</b>	NNews	1/2 IE, 1/2 P&S
Barefoot, Eddie *	NNews	Supt Pipe Shops
Daniels, Bill *	NNews	Section Mgr
Goldmeyer, Fred'k *	Chsn-N/S	Empl Dev Br (CAPT)
Hockett, Ronald E. *	NNews	Mgr Mfg Engrg
Huchette, Karen	Norf-N/S	Supv Ind Engr
Kuhn, Brian E. *	NNews	Project Engr
Long, John T. *	NorShipCo	Mgr, Govt Accts
McCoy, David F.	Norf-N/S	Planning Mgr
Meador, Charles *	NNews	Project Engr
Meeks, Fred W. *	NNews	Section Mgr - PC
Moncrief, Michael *	NNews	Ind Engr
Pearlstein, Amy *	NorShipCo	Plan'g Supv
Twine, Robert D., Sr.	NorShipCo	VP-Berkley Prod
Wallen, Rex A. *	NNews	Supv Mfg Engr
Williams, Joseph I. *	NorShipCo	Plt Mgr - Berkley
Wykle, Randy	Norf-N/S	Supv Ind Engr
Young, David	Norf-N/S	Planner

**BATH, ME - 04 Nov 1992: 26 registered; 18 actual attendees**

Cookson, David R. *	BIW	Prod Engr
Cromwell, C. A.	BIW	Mgr Shop Sched, Mach
Dentico, Robert A. *	BIW	Planner, Mach Shop
Downs, Donald E., Jr. *	BIW	Supv Shop Floor Control
Gleason, Al *	BIW	Senior Asst Frmn Paint
Grinnell, Barry G. *	BIW	Supv Shop Sched, Mach
Hamilton, W.	BIW	Planner, Mach Shop
Hamlin, Currie **	BIW	Mgmt Devel Intern
Heuer, Helmut L. *	BIW	Prod Foreman
Keen, Taylor	BIW	Mgmt Div Intern
Kenney, Marvin E.	BIW	Mgr Prod Cont Ship Compl
Kirby, Patrick D. *	BIW	Analyst
Lasher, Mark E. *	BIW	Manager
Lones, Audrey G.	BIW	Corp Plan'g - Principal Plnr
Lussier, Kirk J.	BIW	Supv Prod Engr
Lynch, Patrick J.	BIW	Supv Sched Pipe Fab
McAuliffe, Mark	BIW	Dir Prod Cont
McCarthy, John A.	BIW	Mgr Central Plg & Report'g

McKenzie, Michael J. *	BIW	Mgr Prod Cont - Facilities
Neeson, J. D. *	BIW	Asst Foreman
O'Hare, James P.	BIW	Director Estimating
Paradis, Armand **	BIW	Prod Engr
Philippon, William *	BIW	Senior Planner Paint
Sikora, Keith A. *	BIW	Mgr Corp Plan'g
St. Pierre, Ray J.	BIW	Mgr Prod Cont Ways
Walsh, Kimlerly *	BIW	Prod Engr
Weatherhead, Steven D. *	BIW	Analyst
Young, Carl *	BIW	Prod Engr

**PORTSMOUTH, NH - 05 Nov 1992: 23 registered; 21 actual attendees**

Allaire, Michael F. *	Ports-N/S	Elec Gen Foremn
Bilodeau, Daniel M. *	Ports-N/S	Admin Asst
Briggs, Gary	Ports-N/S	Shop Supt X99
Chesnel, Donald E. *	Ports-N/S	Nuc Dir 951/67
Dorr, Dennis R. *	Ports-N/S	Supt Rigger
Fisher, Thomas F. *	Ports-N/S	Gen Frmn Painter
Hagerty, William J. *	Ports-N/S	Ind Engr
Hale, Robert *	Ports-N/S	Supv Prod Controller
Ham, Matthew *	BIW	Supv Scheduler
Harper, Robert H., Jr. *	Ports-N/S	Ind Engr
Lapanne, Dennis	Ports-N/S	P&E Elec
Lee, Chetwood B., Jr. *	Ports-N/S	Ind Engr
Legere, Paul R.	Ports-N/S	Supv Ship Sched
Lynch, Dale G. *	Ports-N/S	Prod Supt
Lynch, Patrick **	BIW	Sched/Plg Supv - Pipe Fab
Moghabghab, Robert R.	Ports-N/S	Prod Shop Plnr
Pevery, Craig *	Ports-N/S	Ind Engr
Place, Arthur *	Ports-N/S	Supv Sched
Quinney, John A. *	Ports-N/S	Shop Supt X64
Robinson, Alan M. **	Ports-N/S	Nuc Project Engr
Seward, Gregg P. *	Ports-N/S	Supv Prod Shop Pl
Smith, Leslie H. *	Ports-N/S	Supv Prod Planner - Mach
Taylor, Karen Denise *	Ports-N/S	Ind Engr
Vozzella, Robert C. *	Ports-N/S	Overhaul Fac Mgr
Walker, David P. *	Ports-N/S	Supv Ind Engr

**BREMERTON, WA - 12 Nov 1992: 28+ registered; 27 actual attendees**

Beardon, Denver R. *	PS-N/S	Planner X31
Carter, Larry *	PS-N/S	Ind Engr Tech
Claeys, Mike *	PS-N/S	Gen Foreman X06
Clauson, Edward *	PS-N/S	Gen Foreman X67

Comback, Ed	PS-N/S	Adv Planning Mgr
Davies, James E.	PS-N/S	Foreman X31
Ellermeier, Joel E. **	PS-N/S	Ind Engr
Ferree, Rick	PS-N/S	Gen Foreman X31, Plg Off
Fisher, Daphne *	PS-N/S	Ind Engr
Foley, Neal R. *	PS-N/S	Foreman X31
Fritz, Rochelle *	PS-N/S	Prod Contr, W'load Frct
Hammar, Byron *	PS-N/S	Ind Engr
Hendrickson, Charles *	PS-N/S	Proj Off, X31
Johnson, Larry **	PS-N/S	Supv Ship Scheduler
Kalmbach, Ed	PS-N/S	Adv Plg Mgr
Krahner, Paul *	Todd Seattle	Proj Planning Supv
Lorarra, Paul	PS-N/S	Sys Scheduler
Luis, Thomas S. *	PS-N/S	Ind Engr
Meek, Wayne *	PS-N/S	Gen Foreman X31
Moreira, Paul M. **	PS-N/S	Nuc Sched Supv
Nopp, Timothy D. *	PS-N/S	Ind Engr Supv
Novorolsky, W. J. **	PS-N/S	Nuc Sched Tech Support
Patterson, David *	PS-N/S	Ind Engr, Mech/Elec
Peters, Vic *	Amer Mgt Sys	Consultant
Quinn, C. James	PS-N/S	Ind Engr Tech
Rowan, Gary *	PS-N/S	Prod Contr, W'load Frct
Smith, Edgar *	PS-N/S	Prod Contr, W'load Frct Svr
Smith, Thomas D. **	PS-N/S	X31 Planner
Sperber, John W. *	PS-N/S	Prod Contr, W'load Frct
Timmerman, John H. *	PS-N/S	Ind Engr
Ulrigg, Charles W. *	PS-N/S	Prod Contr, W'load Frct
Wray, Mike *	PS-N/S	X51 Nucl Coord
Zmijewski, Ronald W. *	PS-N/S	Ind Engr

**VALLEJO, CA - 17 Nov 1992: 31 +2? registered; 15 actual attendees**

Angers, Norman	MI-N/S	Scheduling C-227.5
Bartch, Danny	MI-N/S	Pipe Shop X56
Brickeen, Allen *	MI-N/S	QA C-136
Brown, Colin (?)	MI-N/S	Supt Mach
Brown, Terry	MI-N/S	Pipe Shop X56
Broyles, Edwin W. *	MI-N/S	Inspector Supv NDT
Del Toro, Ray *	MI-N/S	C-248.32
DeCosta, Chuck *	MI-N/S	Design Struct C-260
Desnoyer, Noel C. *	MI-N/S	Inspector Supv NDT
Ellis, William	MI-N/S	Shop Supt Paint X71
Estes, Rick	MI-N/S	Scheduling C-227.4
Ficarra, Leonard	MI-N/S	Gen Frmn Elec X51

Fulton, George	MI-N/S	Scheduling C-227.2
Hall, Ross	MI-N/S	Scheduling C-227
Johns, E. P. *	Chsn-N/S	Support Sys Branch Head
Langston, Bob	MI-N/S	P&E
Lemos, Ronald A. *	MI-N/S	C-338M
Maples, Shelly *	MI-N/S	C-1212.2
Organ, Ed *	MI-N/S	Work Package C-222
Padilla, Art	MI-N/S	C-970
Praeger, Al	MI-N/S	Scheduling C-227N
Quichocho, Dave	MI-N/S	C-248.32
Renfrow, James	MI-N/S	Scheduling C-227.3
Rosenow, Vern *	MI-N/S	C-248.31
Ross, Doug *	MI-N/S	Off-Yard Proj Off (LCDR)
Smith, Warren	MI-N/S	Business Office
Storms, Wayne	MI-N/S	QA C-133
Thomas, Philip *	MI-N/S	Plg & Logistics Supv
Thompson, Daryls *	MI-N/S	C-1212.3
Thompson, Les	MI-N/S	Scheduling C-227.1
Tygart, Ray	MI-N/S	Scheduling C-227P
Wanlass, Lawrence *	MI-N/S	C-248.31
Werth, Dave (?)	MI-N/S	Service Grp Supt
Whitely, James	MI-N/S	Supt Elec X51
Williams, Richard *	MI-N/S	Work Package C-222
Wilson, Jim	MI-N/S	Design C-244.1
Wright, Paul	MI-N/S	C-972

**SAN DIEGO, CA - 02 Dec 1992: 25 registered; 20 actual attendees**

Ball, John A. *	NASSCO	Prod Mgr
Childs, James **	Beth SP	Local Lodge S-33
Dawley, Roger **	GD/EB	Business Mgr Carpenters
Edgington, Don E. *	NASSCO	Asst Mgr Ground Outftg
Erickson, Jan *	NASSCO	Mgr Repair Support
Evans, Patrick M.	NASSCO	Gen Foreman Welding
Gable, Grant *	NASSCO	Sr Staff Engr
Gaskari, Massood *	NASSCO	Engrg Specialist
Gazzola, Don	SWM	Supv. Scheduler
Guastini, Robert **	GD/EB	Quonsett Point HR Mgr
Guyton, Hugh *	NASSCO	Asst Weld Supt
Haller, H. T. "Tom" *	MarAd 700	Assoc Admin Ship Const/Op
Hansen, Les	(Self)	Consultant
Harger, John H.	Campbell Ind	Planner/Scheduler
Jaeger, Richard *	NASSCO	Sr Planner/Scheduler
Jones, Willie	SWM	Ship Supt

Jones, Willie	SWM	Project Mgr
Langenhorst, D. P.	NASSCO	Electrical Supt
Magness, Tom	Cont Maritime SD	Operations Mgr
Martin, John L. *	NASSCO	Fab Mgr
Nguyen, Marc *	NASSCO	Facilities Engr
Reinhardt, R. **	NASSCO	Planner Scheduler
Robillard, Mikki **	NASSCO	Prod Staff Engr
Rose, M.	NASSCO	Prod Mgr
Rupy, Chuck **	GD/EB	Operations Mgr
Santoyo, Frank **	NASSCO	Sr Staff Engr - Industrial
Sibert, Susan *	NASSCO	Sr Planner Scheduler
Simard, Brian *	NASSCO	Mgr Repair Planning
Simkins, Gary	NASSCO	Supt Piping
Sullivan, Mike *	NASSCO	Sr Welding Engr
White, Don	NASSCO	Supt Prod Services
Zigelman, Charles I.	NASSCO	Mgr Outfit Planning

**PASCAGOULA, MS - 08 Dec 1992: 22 registered; 16 actual attendees**

Adams, Doyle *	Avondale	Head Steel Shop Planner
Bergeron, David L.	Avondale	VP Ops Plg & Sched
Blanchard, Gene, III *	Avondale	Pipe Shop Planner
Briscoe, David *	ISD	Lead Ind Engr
Busiere, Gene *	Avondale	Prod Plg Section Leader
Cook, Michael R.	Bender	Central Plan & Cont Mgr
Davis, W. N.	ISD	Sr Ind Engr
Dufrene, Brian A. *	Avondale	Steel Shop Planner
Foret, Nelson J., Jr. *	Avondale	Plate Shop Planner
Fradella, Frank A. *	Avondale	Pipe Shop Supvr
George, J. B., Jr. *	ISD	Ind Engrg Specialist - Paint
Harper, R. D. *	ISD	Section Mgr Ind Engrg
Hartman, John W. *	Avondale	Steel Shop Planner
Howell, K. C.	ISD	Section Mgr Ind Engrg
Jackson, R. D. **	ISD	Lead Ind Engr - Pipe
Marks, Jude **	Avondale	Prod Engrg
McElroy, Randy *	ISD	Senior Ind Engr
Mounsey, Don *	Avondale	Sheetmetal Shop Planner
Oehmichen, Bob	Avondale	Prod Engrg
Pennell, L. J.	ISD	Supv Ind Engrg
Shorkley, Jay T. *	ISD	Ind Engr
Truxillo, F. J. "Sonny" *	Avondale	Prod Planner
Walker, Larry M.	Trinity Marine	Mgr Special Projects

**HOUSTON, TX - 10 Dec 1992: 2 registered; CANCELLED**

Registrants notified on 23 Nov 1992. Handout mailed to each.

Cottrell, Roy H.	Bludworth Bond	Engr
Kriner, Michael J.	Houston Ship Rep	Repair/Proj Mgr

**HONOLULU, HI - 06 Jan 1993: 5 + 20? registered; CANCELLED**

Registrants notified on 21 Dec 1992. Handout mailed to each.

Dewitz, Bob	Honolulu SY	VP - Gen Mgr
Heckel, Karl Sr.	Honolulu SY	Shop Foreman
King, Ed	Honolulu SY	Prod Supv
Mailolo, Henry W.	PH-N/S	Prod Supt X51
Mattos, Wayne A.	PH-N/S	Prod Supt X31
15 to 20 (Projected)	PH-N/S	Ind Engrs & Planners

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